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STATUS OF ATLANTIC SALMON STOCKS, AREA K, GULF REGION, NEWFOUNDLAND 1989

by

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ABSTRACT

Small salmon commercial and 1SW salmon angling catches in 1989 were below the previous three years. However, small salmon mean commercial catches (1985-1989) were above 1974-1984 means but 1SW salmon mean angling catches (1985-1989) were below 1974-1984 means. Large salmon mean commercial catch (1985-1989) was above 1978-1984 means but similar to 1974-1977 means.

Delaying season openings by 2 - 4 weeks did not appear to increase spawning escapement of 1SW salmon in Area K rivers. Dates when 25, 50 and 75% of small salmon caught in commercial and angling fisheries were not significantly different among three time periods with different season opening dates.

Delaying seasons made the date when 25% of large salmon were caught in commercial and angling fisheries later but did not significantly change dates when 50 and 75% of large salmon were caught. As for small salmon, delaying openings concentrated large salmon commercial catches in the early part of the season from 1985-1989 compared to 1974-1984. Counting fence data from Fischells Brook, 1988-1989, suggests that MSW salmon river returns from standardized weeks 25-30 were much less than in previous years.

Delaying opening dates to week 23 had little effect on exploitation patterns in Area K and spawning escapement in Area K rivers appears to be less than optimum.

RESUME

En 1989, les prises commerciales de petits saumons et les prises sportives d'unibermarins ont été inférieures à celles des trois années antérieures. Toutefois, les prises commerciales moyennes de petits saumons de 1985 à 1989 ont été supérieures aux moyennes de 1974 à 1984, tandis que les prises sportives moyennes d'unibermarins durant la même période ont été inférieures à celles de 1974 à 1984. Les prises commerciales moyennes de gros saumons de 1985 à 1989 ont été pour leur part supérieures à celles de 1978 à 1984, mais comparables aux moyennes de 1974 à 1977.

Le report de l'ouverture de la pêche durant deux à quatre semaines n'a pas semblé avoir amélioré les échappées de reproducteurs d'unibermarins dans les rivières de la zone K. Les dates auxquelles ont a atteint respectivement 25, 50 et 75 % des prises commerciales et sportives de petits saumons variaient peu dans trois périodes de pêche ayant débuté à des dates différentes.

En repoussant l'ouverture de la saison de pêche, on a reculé la date à laquelle 25 % des prises sportives et commerciales de gros saumons avaient été capturées, mais il n'y a pas eu de différence notable pour les seuils de 50 et 75 %. Comme dans le cas du petit saumon, l'ouverture plus tardive a eu pour effet de concentrer les prises commerciales de gros saumons au début de la saison de 1985 à 1989, contrairement à ce qui s'est produit de 1974 à 1984. Les données provenant des barrières de dénombrement du ruisseau Fischells de 1988 à 1989 semblent indiquer que les remontées de redibermarins dans les semaines de référence 25-30 ont été inférieures à celles des années antérieures.

Le report du commencement de la pêche à la semaine 23 a donc eu peu d'effet sur les régimes d'exploitation dans la zone K. Les échappées de reproducteurs dans les rivières de cette zone semblent inférieures à leur niveau optimal.

INTRODUCTION

In 1978 commercial and angling season openings in Area K were delayed and sanctuary areas were established in several rivers in an attempt to reduce harvests and increase river returns and spawning escapement (Porter and Chadwick 1983). In 1985, the additional requirement to release all salmon > = 63 cm was added to the management plan. However, small salmon mean commercial catches from 1985-1989 exceeded mean catches from 1974-1984 while small salmon mean angling catches from 1985-1989 were lower than 1974-1984. Thus it appears the management plan did not have the desired effect on commercial fisheries.

In addition, recent reports on the status of Gulf Region Newfoundland stocks have suggested that spawning escapement in Area K, St. Georges Bay, Newfoundland has not increased in recent years. Thus, reduced angling catches may reflect low river returns and not reduced exploitation and increased escapement. These conclusions were based on returns less than spawning requirements to a counting fence at Fischells Brook and juvenile densities < 24 1+ parr/100 m^2 determined by electrofishing on Harrys River (Claytor and Mullins 1989). Hence, there is reason to question whether or not recent management plans are achieving their objectives in Area K.

Evaluating the relationship between Area K fisheries and management plans is important in determining the status of these stocks but also in assessing seasonal adjustments as an effective means of reducing exploitation and increasing spawning escapement. This paper examines the distribution of catches in commercial and angling fisheries during different management plans, counting fence data from Fischells Brook, and juvenile survey data from Harrys River to determine the effect these management plans had on commercial and angling fisheries in Area K.

MATERIALS AND METHODS

Commercial and angling catches by week to all Area K rivers (Fig. 1) from 1974 to 1989 were used to determine the timing of catch in these fisheries. The years examined were divided into three time periods based on differences in season opening dates (Table 1) assigned to standardized weeks (Table 2). Time period 1 includes 1974-1977 and is the period of the earliest opening dates for commercial and angling seasons. Time period 2 includes 1978-1984 and represents the latest opening dates for Area K. During this period the commercial season was delayed three weeks and the angling season was delayed two weeks in Statistical Section 40 and four weeks in Statistical Section 41 (Fig. 1). Time period 3 includes 1985-1989 and angling opening dates were two weeks later than period 1 in Statistical Section 40 and 41 and commercial opening dates were the same as period 2. Period 3 also includes the requirement to release all salmon > = 63 cm. Because period 1 had the earliest opening dates, catches during this period can be used to establish the expected catch-timing and exploitation patterns for Area K stocks.

A counting fence operated at Fischells Brook (Fig. 1) from June 10 to August 21, 1988 and from May 18 to August 14, 1989 was used as an index of run-timing and numbers of 1SW and MSW salmon returning to Area K rivers. These counts were particularly important for large salmon because catch statistics are not available for these salmon since 1984.

Juvenile densities determined from electrofishing on Harrys River (Figs. 1, 2) in 1987 and 1988 were used as indices of spawning escapement in that river for 1985 and 1986.

The appropriateness of Fischells Brook and Harrys River as indices for Area K was determined by examining correlations between angling catch in Area K and these rivers and similarity in catch-timing between Fischells Brook and other Area K rivers. Before each correlation was run the angling catch for each river was subtracted from the total for Area K.

RESULTS & DISCUSSION

Small salmon commercial and angling catches in 1989 were below the previous three years. However, small salmon mean commercial catches from 1985-1989 were above 1974-1984 but small salmon mean angling catches from 1985-1989 were below 1974-1984 means (Fig. 3).

Large salmon commercial catches in 1989 were below the previous three years but large salmon mean commercial catches from 1985-1989 were above 1978-1984 means and similar to 1974-1977 means. Large salmon mean angling catches from 1978-1984 were below 1974-1977 mean catches (Fig. 4).

For small salmon, there were no significant differences ($p > 0.05$) in catch-timing of commercial and angling fisheries measured by days when 25, 50, and 75% of the fish were caught (Fig. 5). One effect that might be expected from a delayed opening, if appreciable numbers were harvested in weeks prior to the later opening, would be for the dates when 25, 50 and 75% of the fish caught to also be delayed. That this did not occur suggests that delaying opening dates did not appreciably alter the exploitation pattern and increase escapement. Small salmon commercial catch distributions were also shifted to earlier weeks during period 3 (Fig. 6) suggesting that recently, exploitation patterns have shifted to an earlier portion of the small salmon run.

In the small salmon angling fishery for period 2 there was a large increase in the relative catch in week 25 compared to periods 1 and 3 when the seasons opened earlier (Fig. 7). If this relative increase had represented an increased escapement from the commercial fishery we would expect a bimodal distribution to appear in period 3 angling catches when the commercial fishery opened at the same time as period 2 but the angling fishery opened earlier. That the distribution in period 3 was similar to period 1 suggests that this increase was not the result of increased abundance. Similar effects were observed in the Fischells Brook angling fishery (Fig. 8). In addition, small salmon returns to the counting fence at Fischells Brook indicate that few fish return in weeks 21

to 26 relative to 27 to 34 (Fig. 9). Salmon appear to be vulnerable to angling fisheries located near the river mouths for at least up to week 25. Hence, if seasonal adjustments are to be used to increase escapement in Area K they must be delayed more than in the past.

For large salmon, there were no significant differences in catch-timing of 50 and 75% date of catch among time periods for commercial and angling catch. Date of 25% catch was 1.5 weeks later for time periods 2 and 3 in these fisheries but the differences were not significant (Fig. 5). Large salmon commercial catches were shifted more toward earlier weeks as were small salmon commercial catches in period 3 (Fig. 10). The relative increase in angling catch in week 23 of period 2 (Fig. 11) was likely the result of delay in timing in moving upstream as for small salmon. Hence, in general the delay in seasons likely did not increase spawning escapement in Area K rivers.

The angling season in some rivers, Statistical Section 41, of Area K was delayed two additional weeks, from week 23 to week 25. Catch-timing changes at Fischells Brook suggest that this additional delay did increase escapement of large salmon relative to rivers which opened in week 23. For example, angling catch-timing in Fischells Brook was similar to Area K for period 1 (Figs. 11, 12). The season at Fischells was delayed until week 25 in period 2. For this time period there was not a relative increase in catch compared to period 1. Hence, those fish which were previously caught in week 23 likely moved into the sanctuary areas of Fischells and the early run MSW salmon appear to have been protected by shifting the angling season to week 25 in some Area K rivers.

The catch distribution for MSW salmon at Fischells Brook indicates that a large portion of the run is expected to return to the river and be available for harvest during weeks 24 - 30 (Fig. 12). However, in recent years, 1988-89, counts at the fence and data collected from hook and release of large salmon indicates that MSW returns during weeks 24 to 30 were greatly reduced below expected levels during 1988 and 1989 (Figs. 12, 13). If this is representative of other rivers it would be a cause for major concern regarding the MSW salmon stocks of Area K.

Reduced spawning escapements were also suggested by low juvenile densities observed on Harrys River during electrofishing surveys in 1987 and 1988. At only one site did 1+ parr densities surpass the optimum of 24/100 m (Elson 1975) (Table 3).

Significant correlations between Fischells Brook and Harrys River angling catches with other Area K rivers (Fig. 14, $R^2 > 40.45$ and $p < 0.001$ for all regressions) suggest that these two rivers are indicative of relative trends if not absolute measures of abundance, for Area K salmon stocks. The similarity in catch and run-timing between Area K and Fischells Brook also supports the conclusion that Fischells represents the relative trends in Area K salmon stocks.

These trends at Fischells and Harrys River and in catch-timing for all Area K stocks suggests that the management plans have not increased escapement and that Area K salmon stocks are below optimum levels.

REFERENCES

Claytor, R.R. and C.C. Mullins. 1989. Status of Atlantic salmon stocks, Gulf Region, Newfoundland and Labrador, 1988. CAFSAC Res. Doc. 89/2.

Elson, P.F. 1975. Atlantic salmon rivers smolt production and optimal spawning - an overview of natural production. Int. Atlantic Sal. Found. Spec. Public. Ser. 6: 96-119.

Porter, T.R. and E.M.P. Chadwick. 1983. Assessment of Atlantic salmon stocks in Statistical Areas K and L, Western Newfoundland, 1982. CAFSAC Res. Doc. 83/87.

Table 1. Seasons associated with time periods mentioned in text.

	Time Period	Recreational	Commercial
1	1974 - 1977	Week 21	Week 20
2	1978 - 1984	Week 23 (Section 41) Week 25 (Section 40)	Week 23
3	1985 - 1989	Week 23 Week 22[1]	Week 23

[1] Opened in week 22 in 1989 only.

Table 2. Standardized weeks used for processing Atlantic Salmon Catch Statistics.

WEEK	MONTH	DAYS	
1	January	01 - 07	
2	January	08 - 14	January
3	January	15 - 21	
4	January	22 - 28	
5	February	49 - 04	
6	February	05 - 11	February
7	February	12 - 18	
8	February	19 - 25	
9	March	26 - 04	
10	March	05 - 11	
11	March	18 - 18	March
12	March	19 - 25	
13	March	26 - 01	
14	April	02 - 08	
15	April	09 - 15	April
16	April	16 - 22	
17	April	23 - 29	
18	May	30 - 06	
19	May	07 - 13	
20	May	14 - 02	May
21	May	21 - 27	
22	May	28 - 03	
23	June	04 - 10	
24	June	11 - 17	June
25	June	18 - 24	
26	June	25 - 01	
27	July	02 - 08	
28	July	09 - 15	July
29	July	16 - 22	
30	July	23 - 29	

Table 2. Standardized weeks used for processing Atlantic Salmon Catch Statistics. (CONTINUED)

WEEK	MONTH	DAYS	
31	August	30 - 05	
32	August	06 - 12	
33	August	13 - 19	August
34	August	20 - 26	
35	August	27 - 02	
36	September	03 - 09	
37	September	10 - 16	September
38	September	17 - 23	
39	September	24 - 30	
40	October	01 - 07	
41	October	08 - 14	October
42	October	15 - 21	
43	October	22 - 28	
44	November	29 - 04	
45	November	05 - 11	
46	November	12 - 18	November
47	November	19 - 25	
48	November	26 - 02	
49	December	03 - 09	
50	December	10 - 16	December
51	December	17 - 23	
52	December	24 - 31	

Table 3. Juvenile Atlantic salmon densities per 100 m^2 found at electrofishing sites on Harrys River, Newfoundland, 1987-1988. N/F indicates years site was not fished. Age classes determined from ageing in 1987 and length classes 1988. Blank indicates zero fish.

Site		1987					1988				
		0+	1+	2+	3+	Total Parr	0+	1+	2+	3+	Total Parr
Main River	1			1.0		1.0	2.4				
Main River	6	12.9	6.3	4.9	2.4	13.6	2.1	9.0	1.5	1.0	11.5
Black Duck	2	13.2	5.3	5.3	1.1	11.7	N/F				
Black Duck	3	4.0	2.6	0.4	0.4	3.4	33.0	5.5	2.9	0.3	8.7
Trout Brook	5	0.5	2.5	1.5	0.5	4.5	2.2	2.7		0.5	3.2
Stag Lake	9	10.4	1.8			1.8	26.8	7.5	0.9		8.4
Pinchgut	7	19.0	9.4	0.7	0.2	10.3	9.7	8.6	2.3	0.6	11.5
Pinchgut	8	34.6	6.2	1.6	1.5	9.3	21.5	13.7	3.4	0.5	17.6
Pinchgut	10	55.6	4.5	1.4	1.1	7.0	58.5	10.8	0.5	0.2	11.5
Gull Pond	11	N/F					4.6	5.9	4.3	8.7	18.9
Pinchgut	12	N/F					3.7	38.1	13.4	12.8	64.3

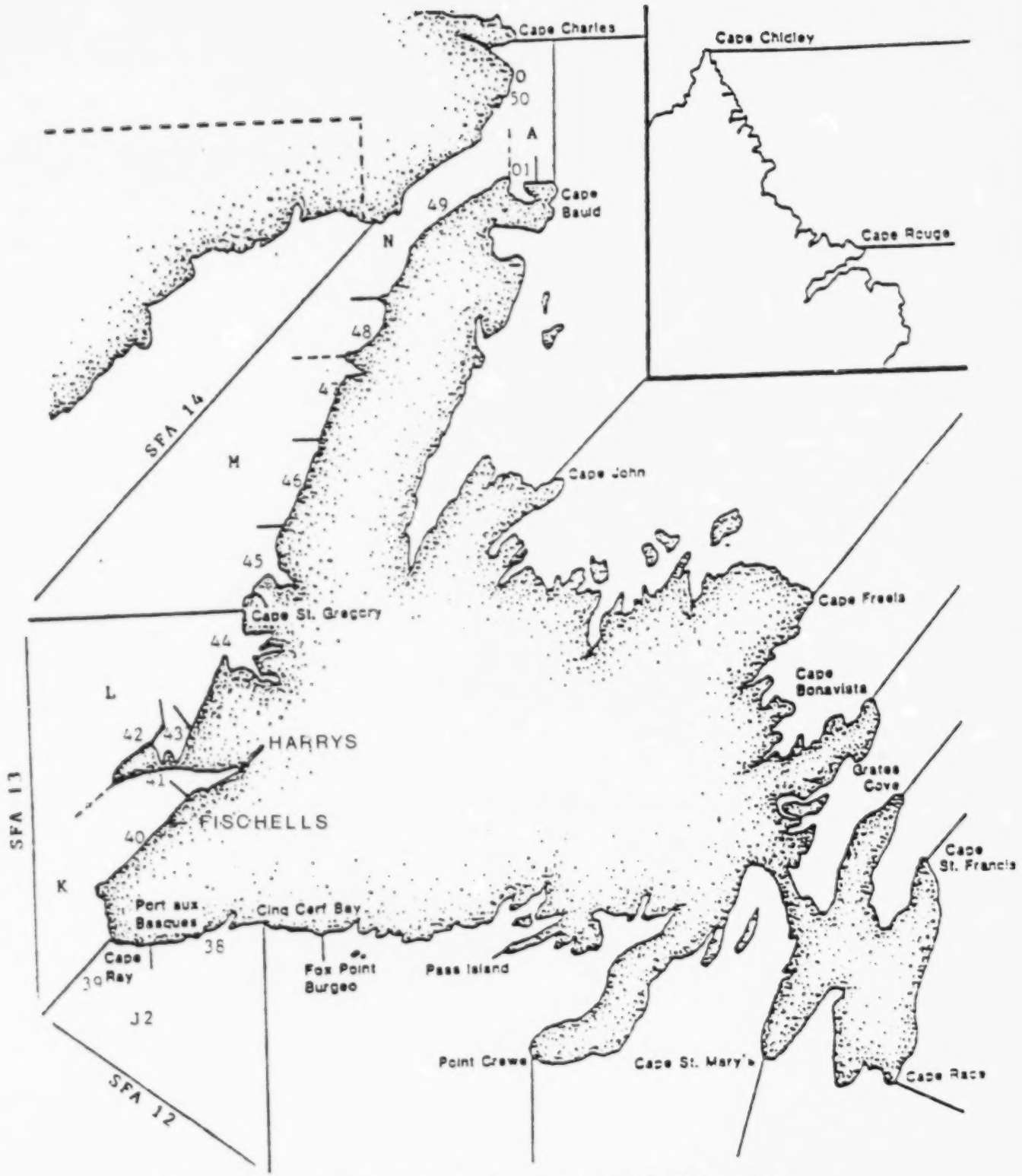

Fig. 1. Boundaries of Salmon Fishing Areas 12, 13, and 14, Statistical Areas, and Statistical Sections, Gulf Region, Newfoundland and Labrador.

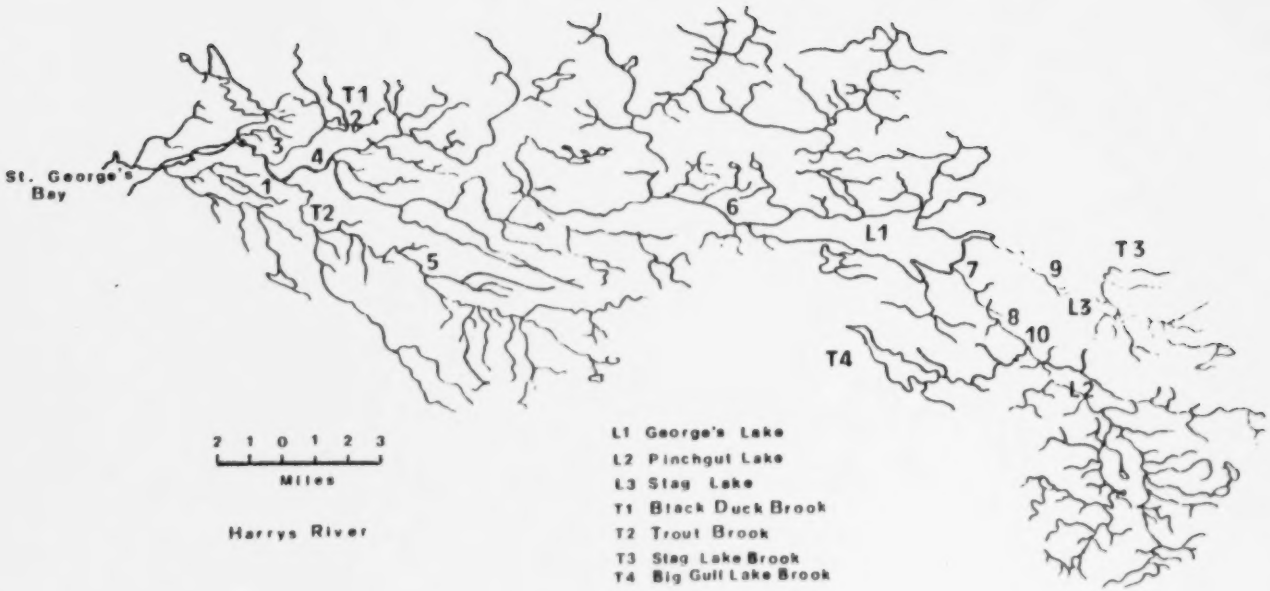

Fig. 2 Location of electofishing sites, Harrys River.

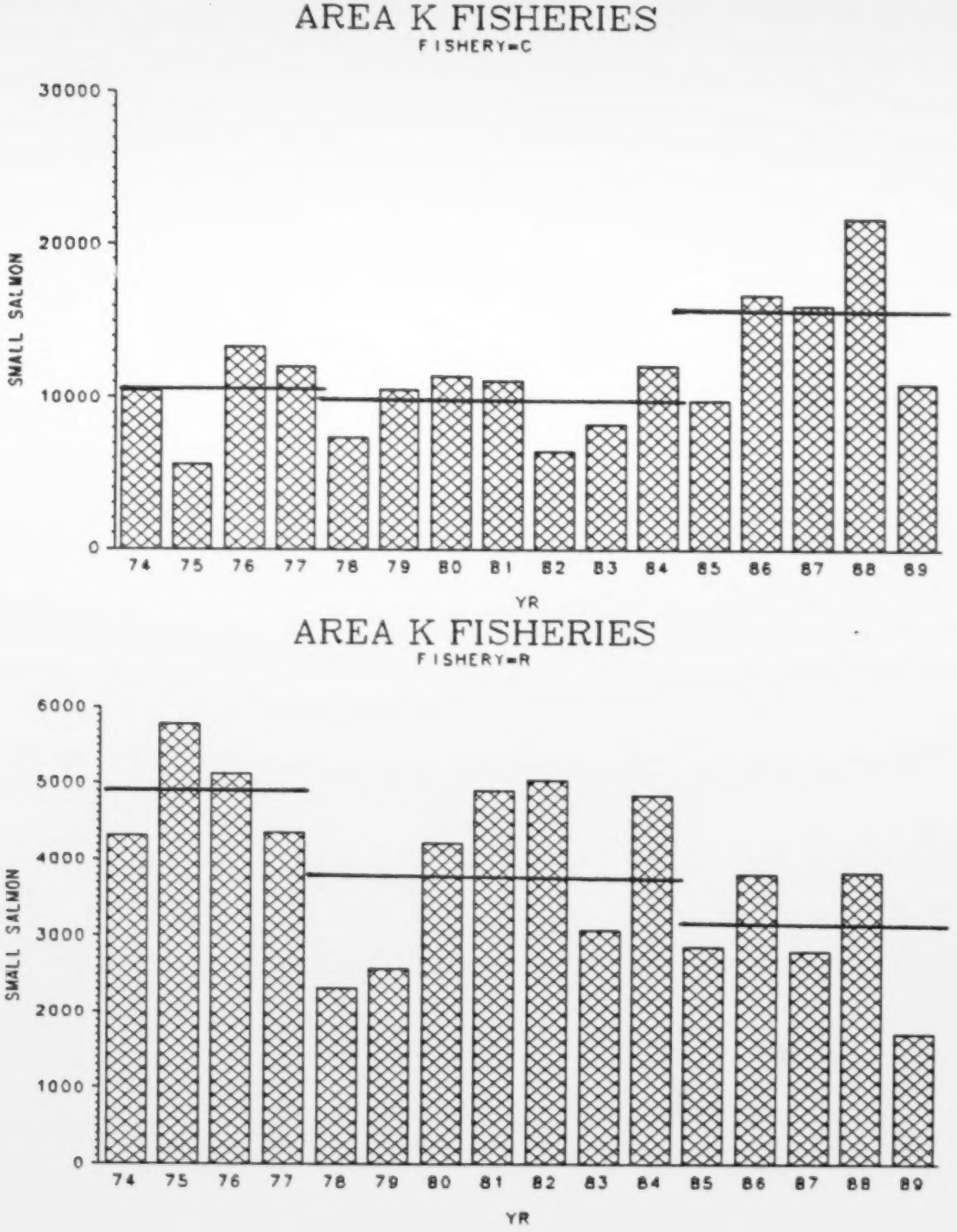

Fig. 3 Mean small salmon commercial (upper, Fishery = C) and angling (lower, Fishery = R) catches in Area K from 1974-1989. Horizontal bars represent mean catches for each time period.

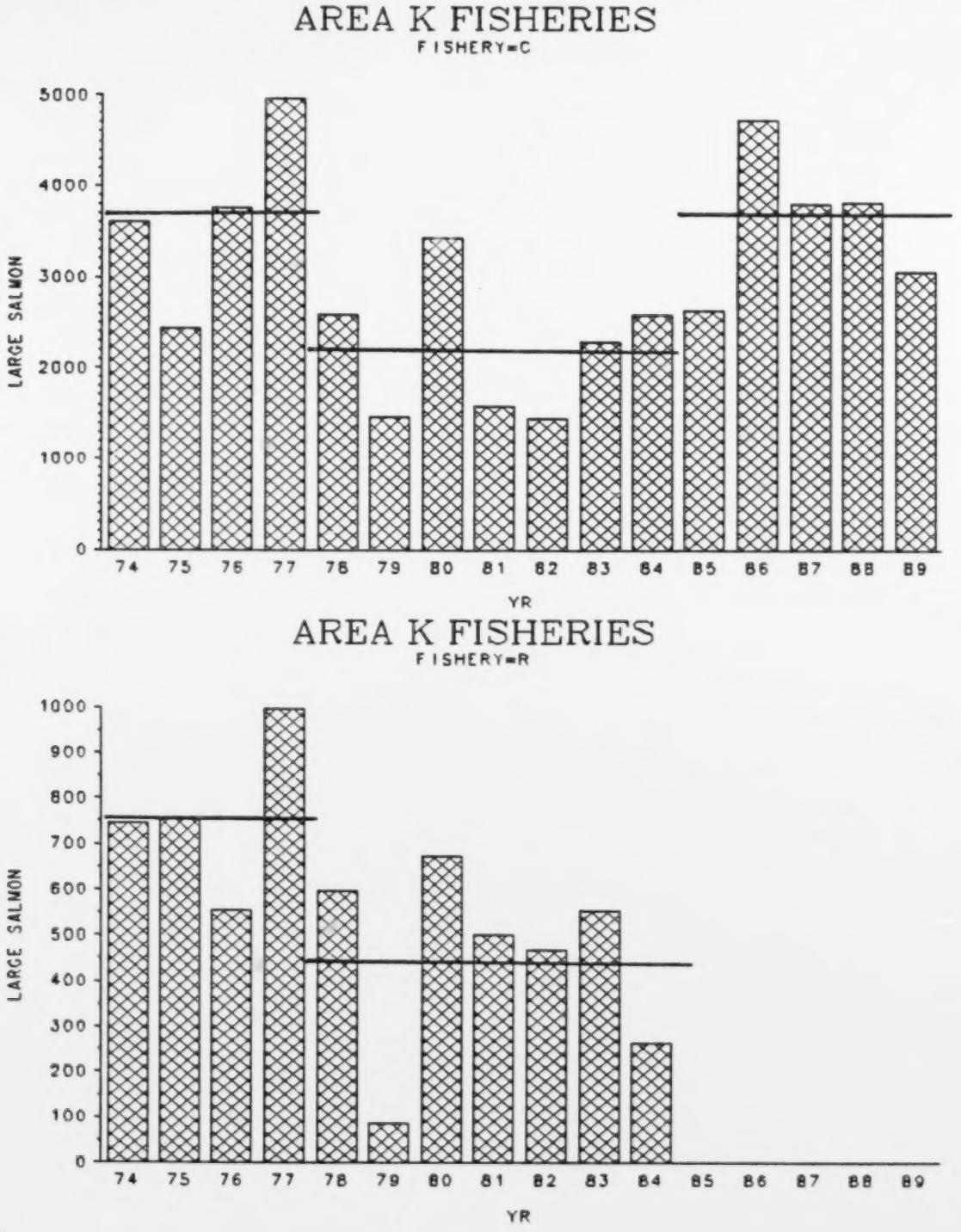

Fig. 4 Mean large salmon commercial (upper, Fishery = C) and angling (lower, Fishery = R) catches in Area K from 1974-1989. Horizontal bars represent mean catches for each time period.

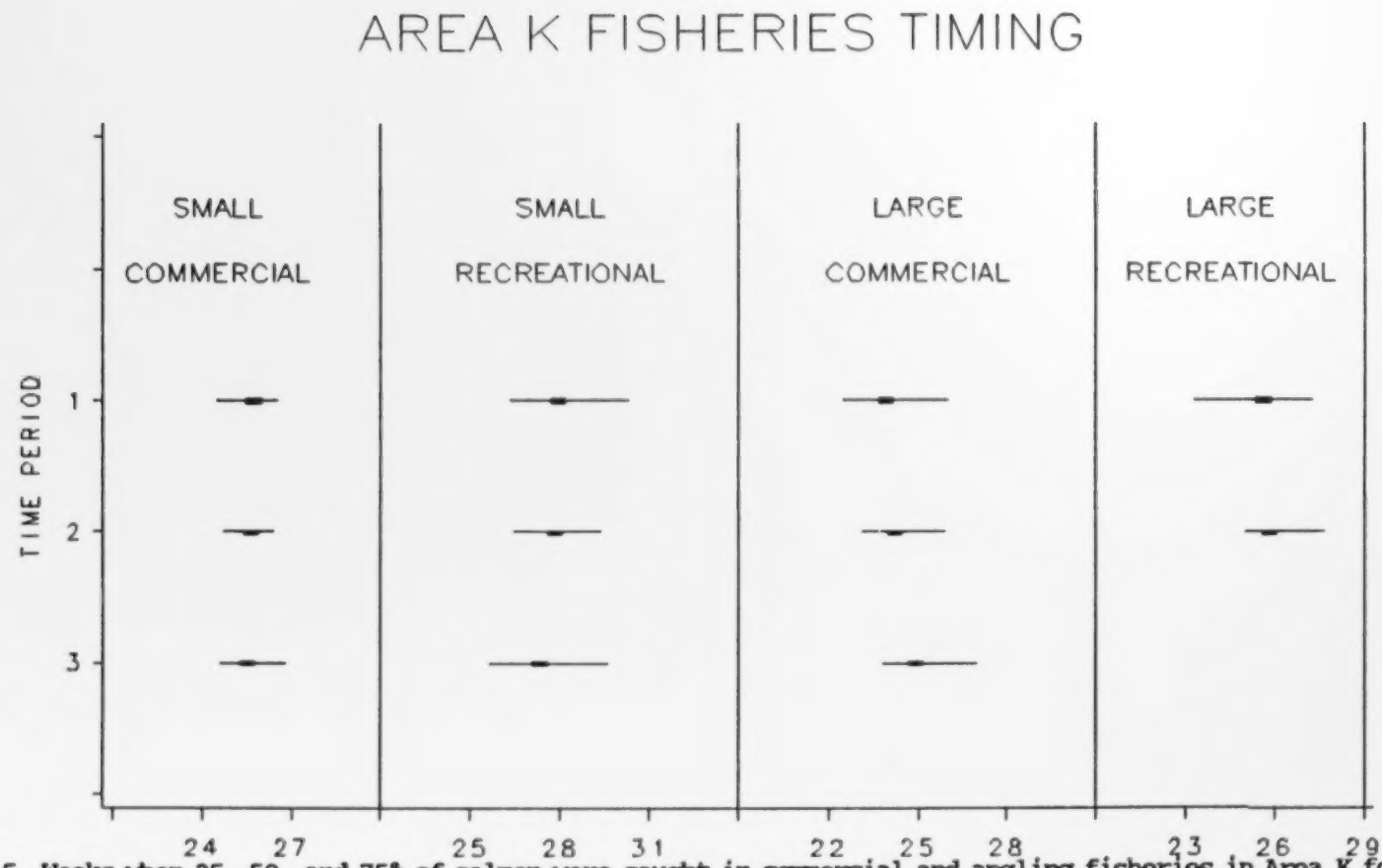

Fig. 5 Weeks when 25, 50, and 75% of salmon were caught in commercial and angling fisheries in Area K for three time periods. Box, represents date when 50% of fish were caught, extremes of horizontal bars represent days when 25 and 75% of fish were caught.

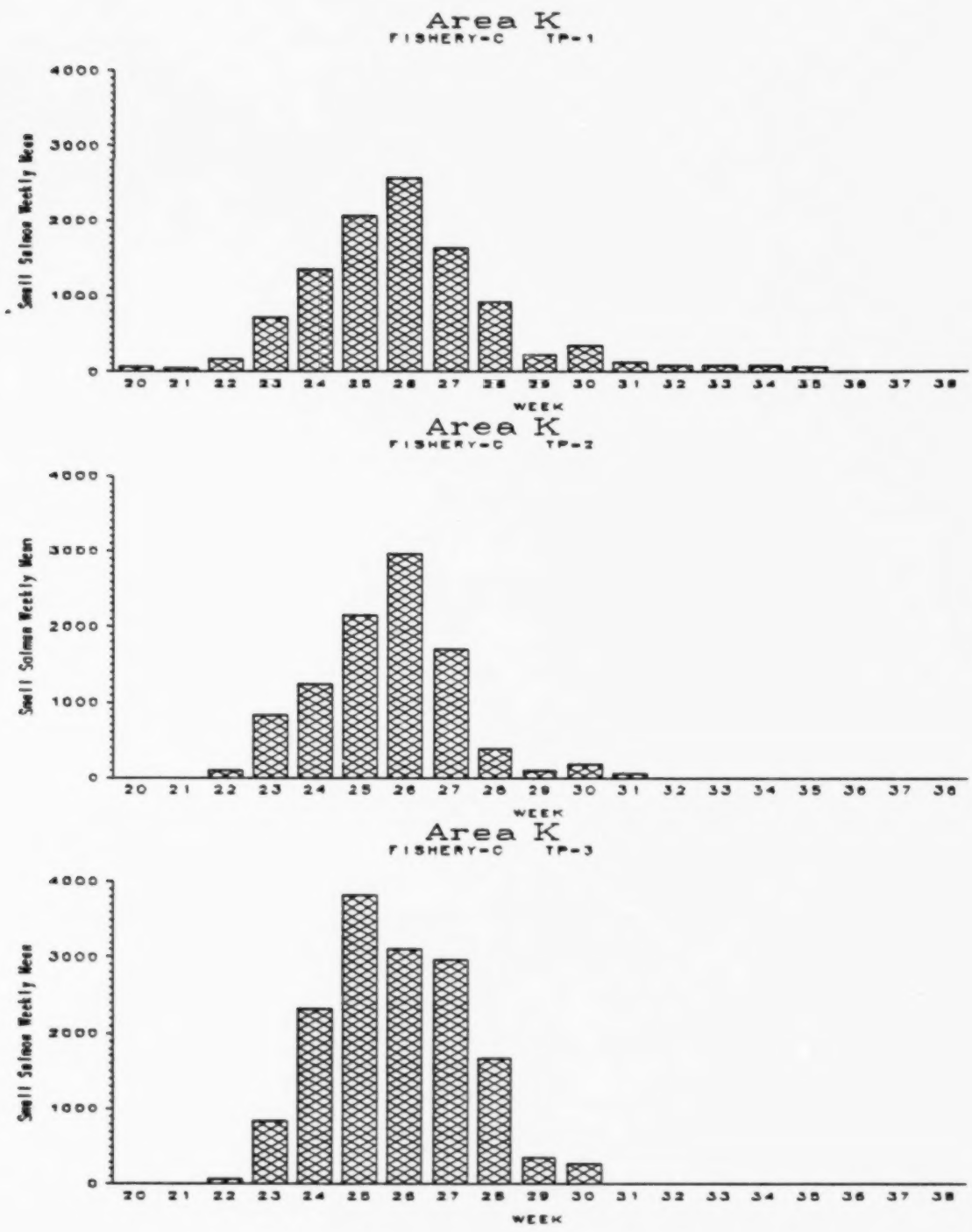

Fig. 6 Mean numbers of small salmon caught each week during the commercial season in Area K for three time periods.

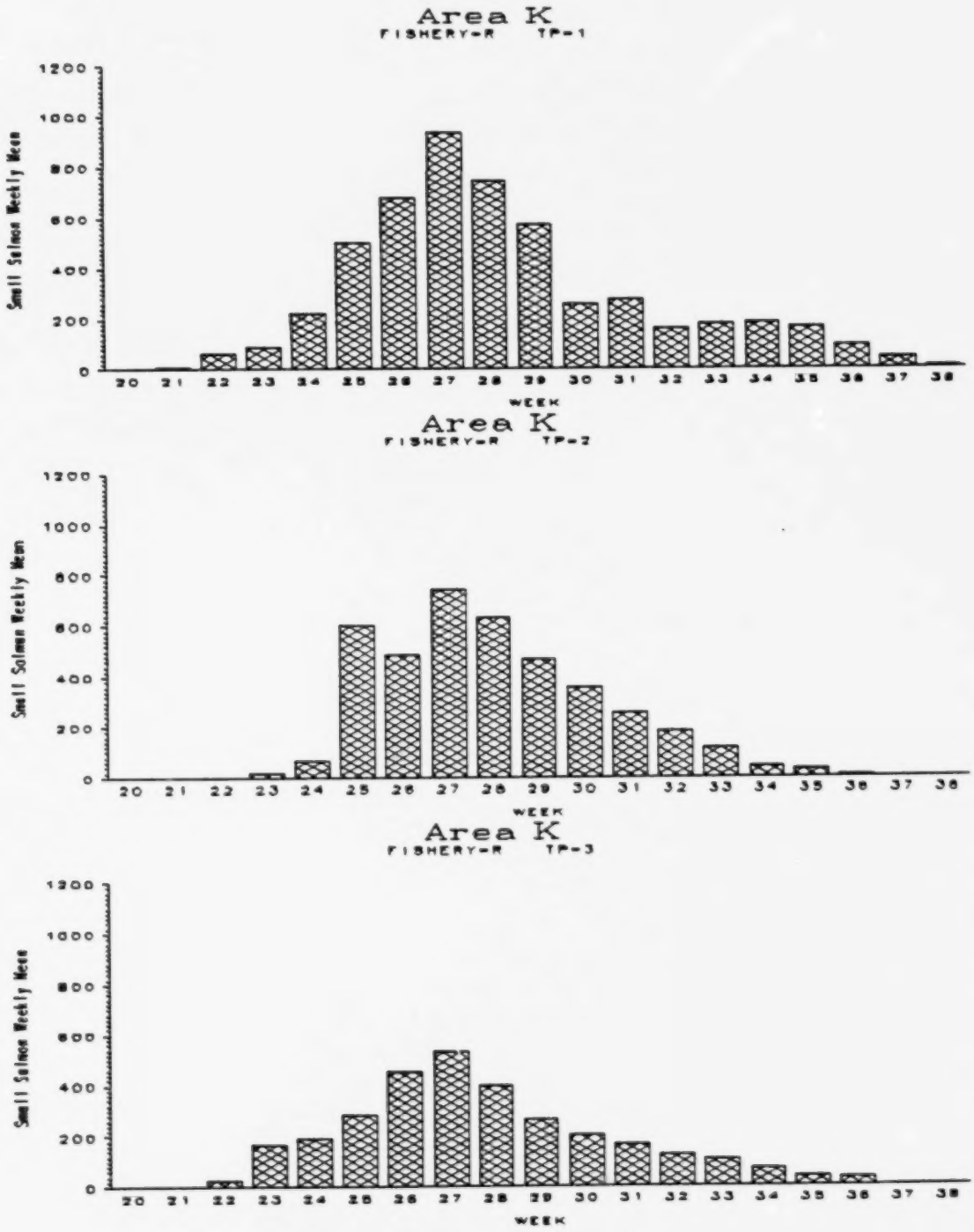

Fig. 7 Mean number of small salmon caught each week during the angling fishery in Area K for three time periods.

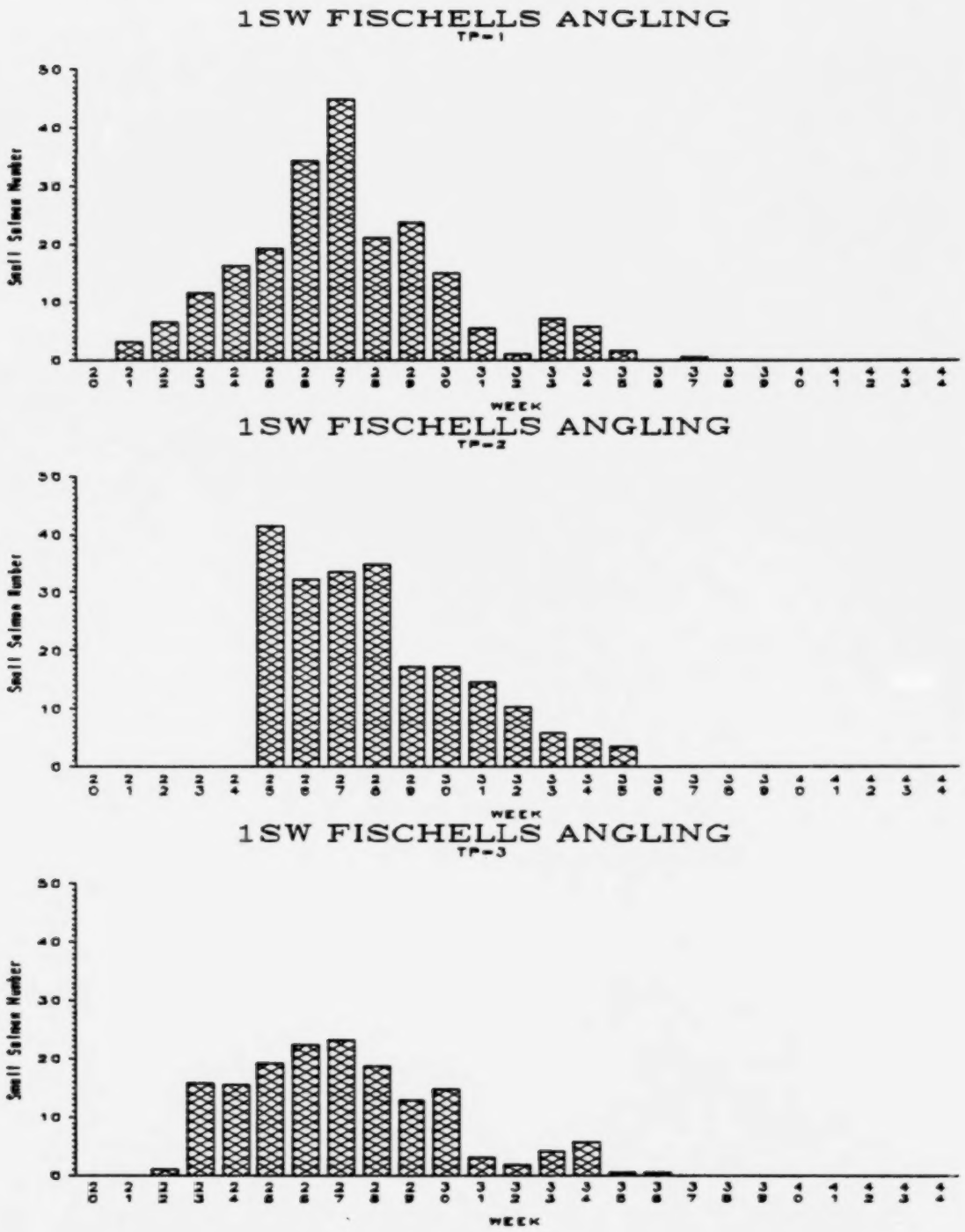

Fig. 8 Mean number of small salmon caught each week during the angling fishery at Fischells Brook for three time periods.

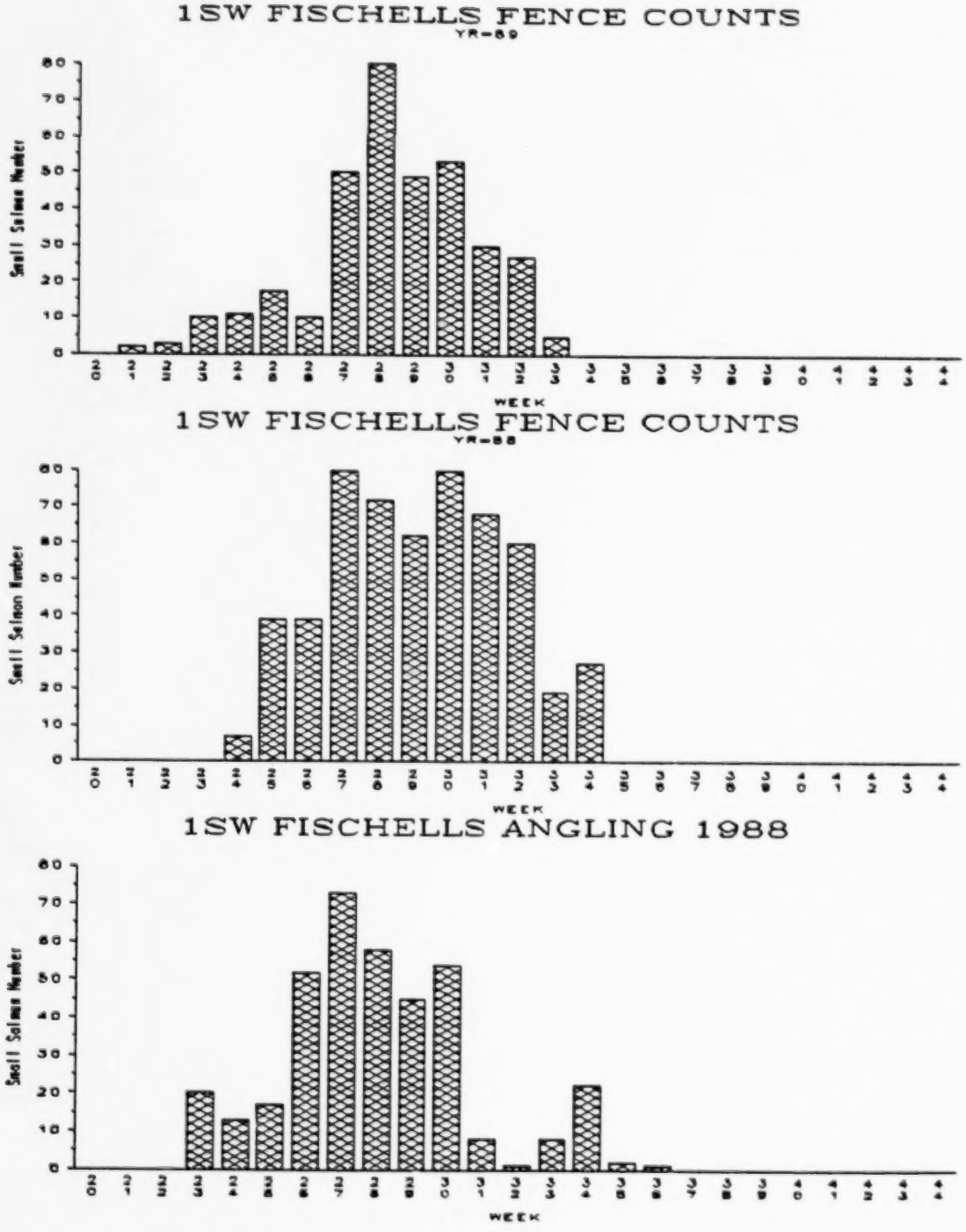

Fig. 9 Numbers of small salmon counted each week at Fischells Brook fence in 1988 and 1989 and number of small salmon angled each week at Fischells Brook in 1988.

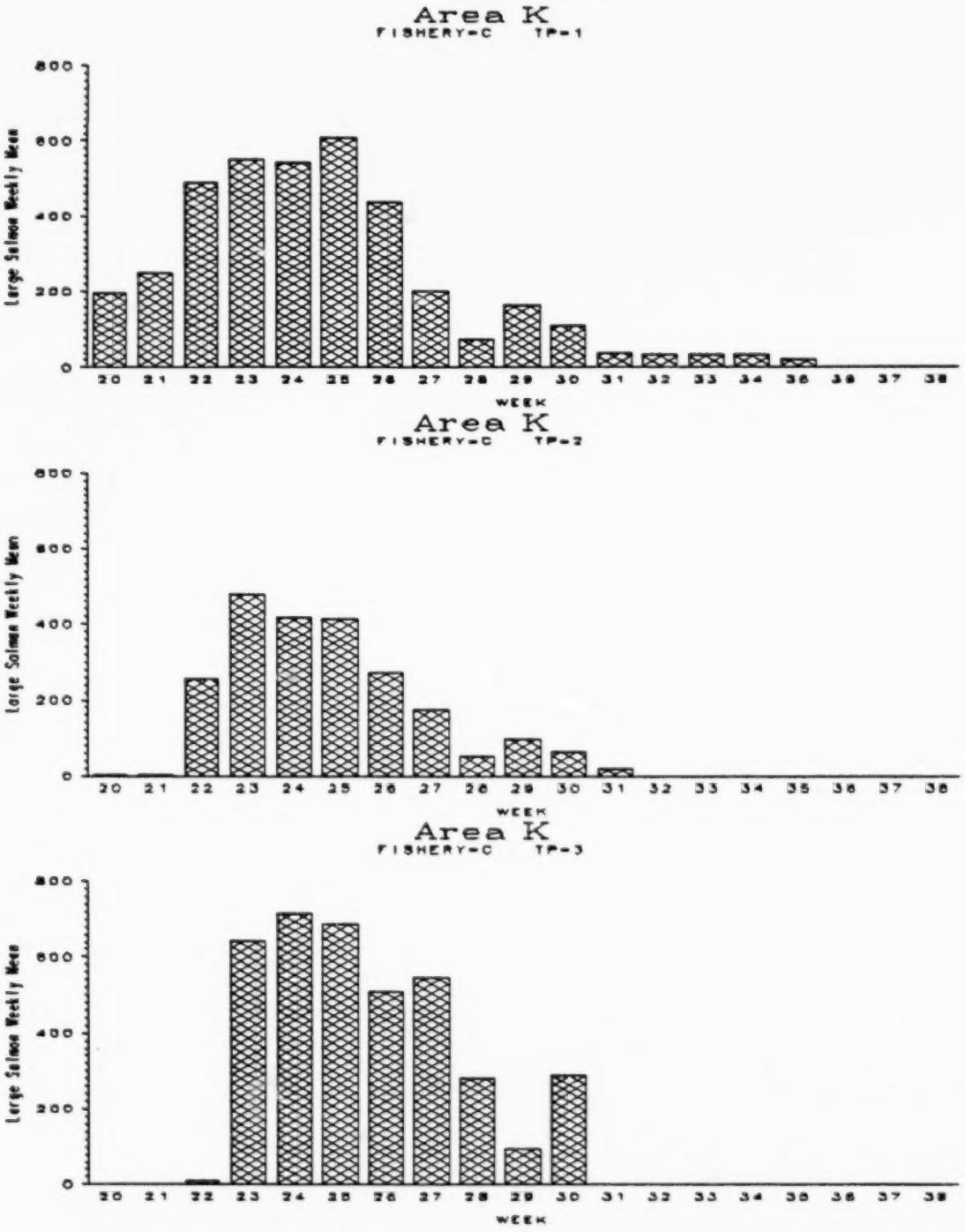

Fig. 10 Mean numbers of large salmon caught each week during the commercial season in Area K for three time periods.

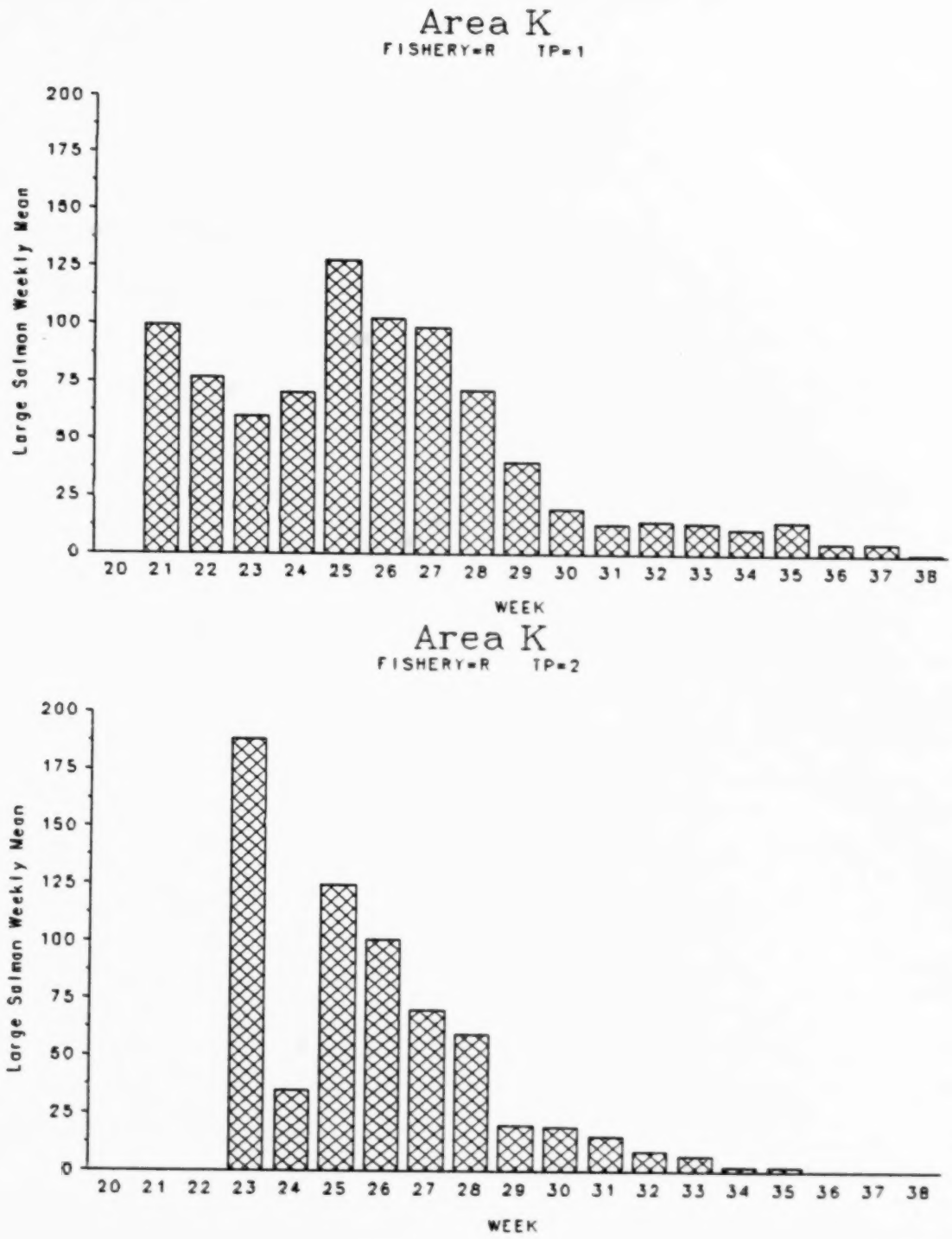

Fig. 11 Mean numbers of large salmon caught each week during the angling season in Area K for three time periods.

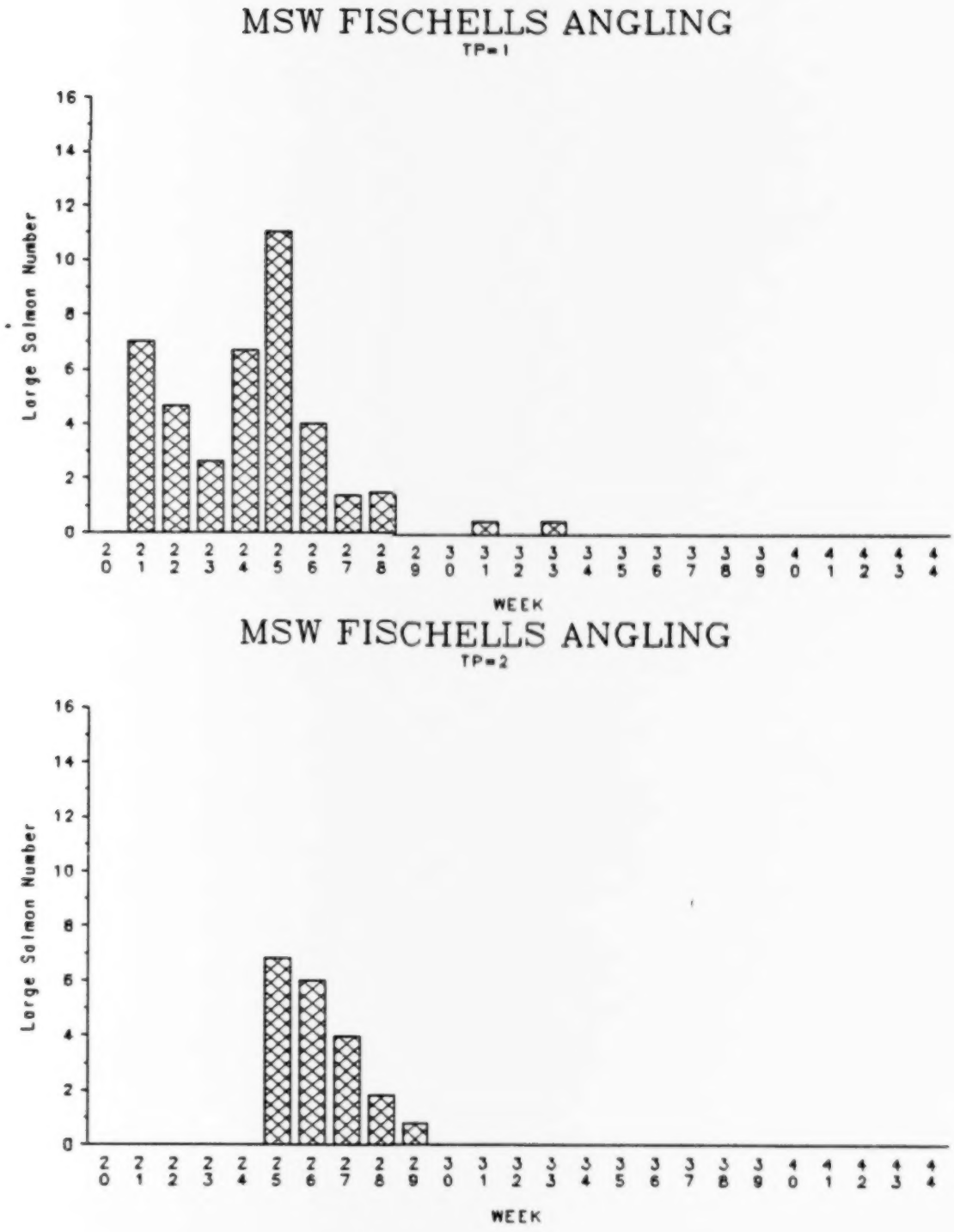

Fig. 12 Mean numbers of large salmon caught each week during angling season at Fischells Brook in three time periods.

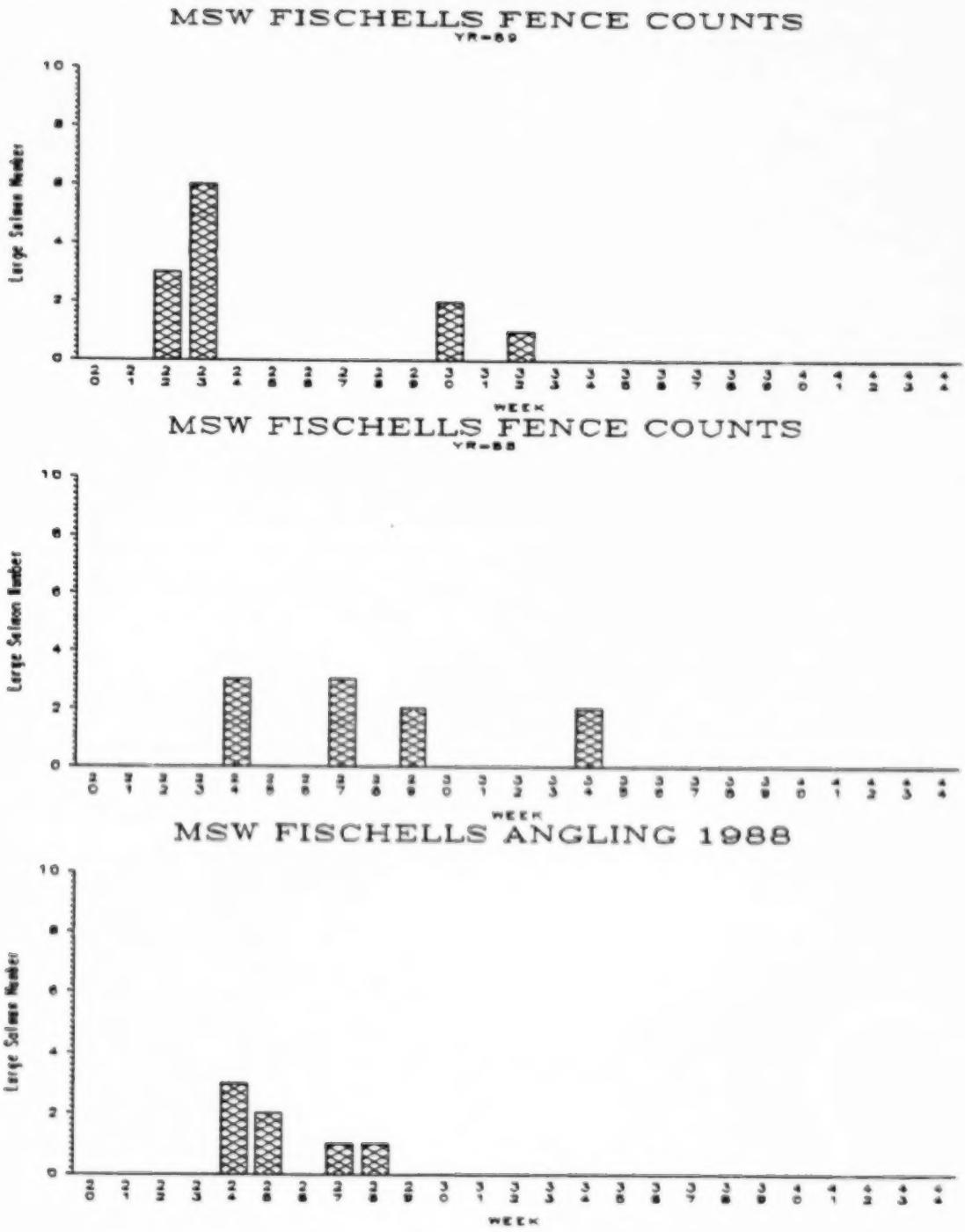

Fig. 13 Numbers of large salmon counted at Fischells Brook fence in 1988 and 1989 and number of large salmon hooked and released in the angling fishery in 1988 by week.

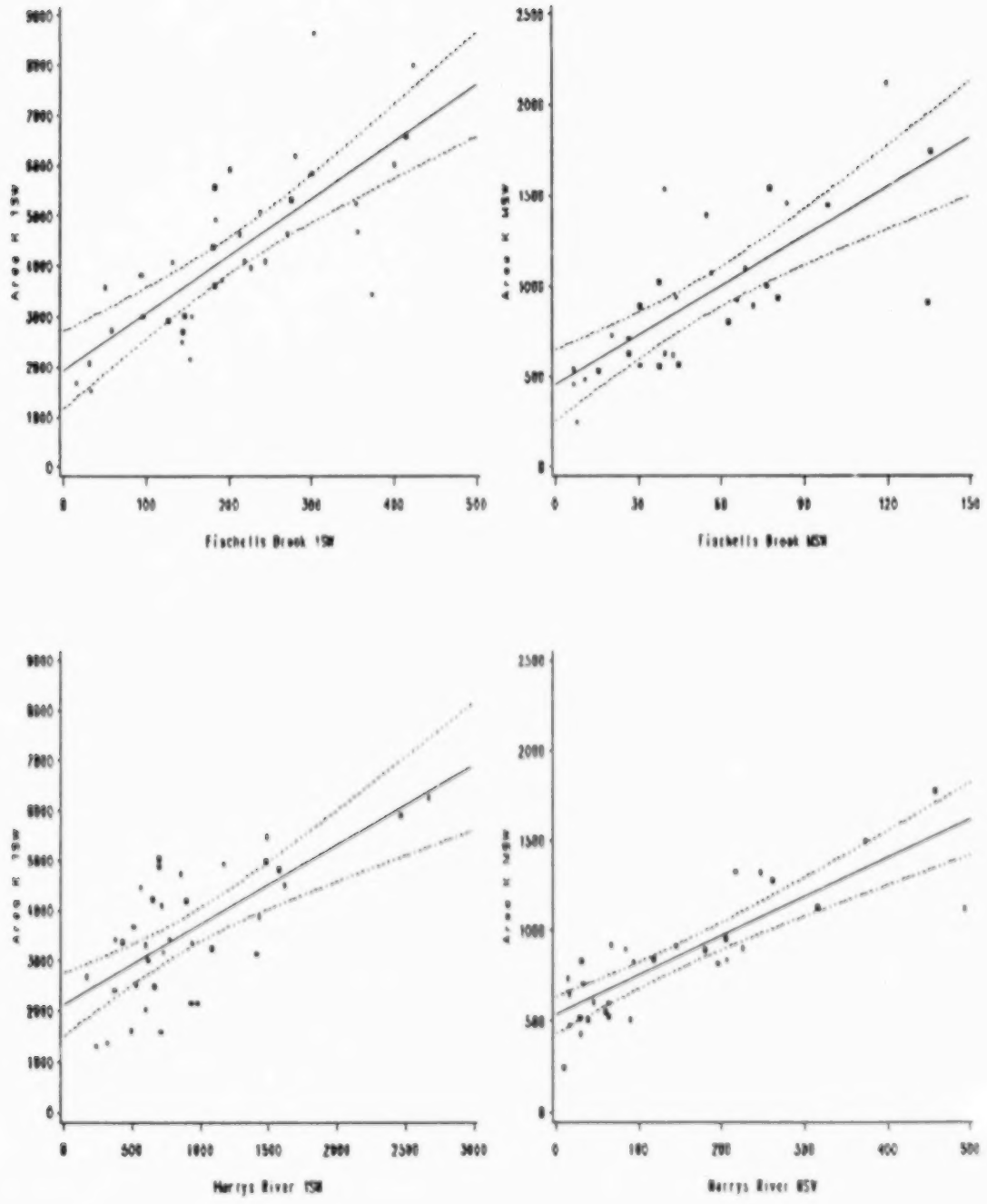

Fig. 14 Regression lines (solid line) and 95% confidence limits for the mean for relationships between Fischells Brook, Harrys River and other Area K rivers angling catch.